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THE PLEURAL CAVITY, WHICH HAVE BEEN TREATED AT  
THE MASSACHUSETTS GENERAL HOSPITAL.

BY WILLIAM F. WHITNEY, M. D.

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## ON EMPYEMA.

AN ANALYSIS OF THE CASES IN WHICH PUS HAS OCCURRED IN THE PLEURAL CAVITY, WHICH HAVE BEEN TREATED AT THE MASSACHUSETTS GENERAL HOSPITAL.<sup>1</sup>

BY WILLIAM F. WHITNEY, M. D.

CONSIDERED simply from a pathological point of view, the difference between pleurisy and empyema is one of degree and not of kind; for even in a serous effusion a few young cells can be found, and from this all stages can be traced to that in which they are so abundant as to form the fluid known as pus. From a clinical point of view, however, the character of the fluid makes a difference in the course and treatment of the disease, and it is from this point that the cases which have occurred at the Massachusetts General Hospital have been considered.

The same trouble is experienced in comparing these cases that is met in the comparison of any series of hospital cases, namely, that as a rule they occur among persons who have very little power of observation, and consequently their statements as regards the time they have been sick or how long certain symptoms have lasted are not always to be relied upon; moreover, after the patients have come under observation, the minuteness of detail varies with the individual who has charge of them, and consequently many of the points that are particularly desirable have not been noted at all in many instances. But even from these imperfect records there are to be obtained certain facts which are of importance in the classification of these cases, and also of some practical interest in reference to their treatment.

The number of cases in which the existence of a purulent fluid within the pleural cavity has been proved to exist is sixty-seven. They can be distributed among two classes: the first, those in which it is primarily an affection of the pleura, and any disease of the lung itself is subsequent; the second, those in which the trouble with the lung is primary, and the affection of the pleura is secondary.

The first series is the one to which the term empyema should be restricted, and presents two forms, the acute and the chronic. The first of these is not generally known, and the distinction between the

<sup>1</sup> A Thesis for the Degree of Doctor of Medicine.

two is not well recognized. But these cases appear to show clearly this distinction, although exception may be taken to the classification of some individual cases. In the acute cases the effusion is apparently purulent from the beginning, while in the chronic cases the effusion is probably at first serous, but later, from neglect of treatment or some unknown cause, it becomes purulent. Of the sixty-seven cases that have occurred, twelve were considered to be of the acute form. In four of the twelve cases, exposure to wet and cold was assigned as the exciting cause; in one, violence, causing fracture of ribs; but in the remaining seven there was no cause assigned. In all the cases, the onset was sudden; chills occurred in three instances; pain in the side, increased on full breath, and sooner or later dyspnoea, was the sequence of symptoms at first. In other words, symptoms of inflammation of the pleura were manifest. In the further progress of the case, especially if the termination was fatal, the symptoms became quite severe, delirium and signs of prostration having been observed. The temperature was taken in two cases, and varied from 101° (Fahrenheit), in the morning, to 103° in the evening. The signs obtained from auscultation and percussion showed merely the existence of a fluid, but of its nature, whether dense like pus or thin like serum, there was no way of determining by those methods. From this it appears that there is nothing truly diagnostic of pus, and it is only when the symptoms in a case of pleurisy are unusually severe that its existence is to be suspected.

As the result of the twelve cases, five died, five recovered, one was doubtful, and one is still under observation. The mortality occurred entirely in adults. The duration of the disease varied from thirteen days to nine weeks. In the very rapid cases the patients appeared to die from the intensity of the disease, while in those more prolonged they seemed to sink from exhaustion. In one case, death was apparently due to pressure of the fluid, for although the effusion was not very large (four pints) it was confined to the anterior and lower part of the chest, and so was able to exert as much pressure as a larger effusion. For Bartels has shown<sup>1</sup> that in effusion into the left pleural cavity, as was the case here, if the effusion is large, when sudden death occurs it is caused by bending the vena cava inferior at a right angle, and thus preventing the return of the blood to the heart, and not by directly paralyzing the heart, as was formerly supposed.

In three of the cases, no attempt was made to remove the fluid; they occurred before the time when puncture of the chest was a common practice. In the other two, paracentesis was twice performed in one, and once in the other, followed in the latter by a permanent opening; gangrene of the lung was supposed to have existed also, but it must have been secondary to the empyema, as no symptom of it was noticed before the existence of pus was detected.

<sup>1</sup> Deutsches Archiv für klinische Medicin, iv., 1868.

The cases which terminated favorably occurred in children or young adults. From these it appears that the usual course of the pus is to find its way to the surface and discharge externally. In two of the favorable cases abscess had formed at the end of four and eight weeks, respectively. In one of these, after spontaneous opening, the discharge was allowed to come away at will, and no attempt was made to wash it out. Tonics were used internally and the case went on favorably. In the others, besides tonic treatment, the side was syringed out twice daily with a solution of tincture of iodine or carbolic acid. These patients were under treatment from four to eight months. In one only was there any complication, and this was a large abscess of the abdominal parietes; the symptoms at first resembled those of peritonitis, but later, pus pointing near the umbilicus, the true nature of the disease was shown, and on opening the abscess the symptoms were relieved.

The case which was doubtful in its termination was punctured once and was then removed from the hospital.

The case that is still under observation occurred in a child, and a permanent opening was made, from which there has been discharge for eighteen months. The general condition has somewhat improved, but the prognosis is as yet undecided.

The question of making a permanent opening in the chest is still discussed, but from these few cases it appears that those in which it was made terminated more favorably than those in which it was omitted. But here must be considered another important element, namely, the age of the patient; for all of the recoveries occurred in children or young adults, and this, as far as it goes, is of great importance.

The next series is that in which there was reason to believe that the effusion was at first serous and later became purulent. The proof that the disease of the pleura was the primary affection and the disease of the lung secondary, if any existed, is not always so clear in all the cases as could be wished, but it is considered that twenty-six belong to this series. The history shows that these cases differed in no way from those of chronic pleurisy in their course, and there is no way of proving the existence of pus, unless it points externally, except by means of paracentesis. In six of them, serum was first detected; and in the remainder pus was found at the primary tapping; but from the length of time during which the effusion had existed, it was to be presumed that the fluid was serous at the beginning.

The results of these cases are very unsatisfactory. Four died, two recovered, and the remaining twenty stayed in the hospital lengths of time varying from a few weeks to a year, but after that their history was generally unknown. All the four cases which terminated fatally had permanent openings, and in these daily injections, generally consisting of carbolic acid and water, were used. In twenty cases the result

was death some time after leaving the hospital, or it was never known. The treatment in five of these cases was by paracentesis alone, and in all of these the patients left the hospital relieved, but the physical signs still showed the existence of fluid. The final result in all these cases was doubtful. In one, paracentesis was performed twelve times within eight months; in the other fifteen, there was either a spontaneous or an artificial opening of the abscess, with subsequent fistula and discharge. In four, daily injections were used. In seven, the symptoms were relieved when the patients left the hospital; one is reported not to have died until ten years after leaving, although his condition was very poor when he left; one had a fistulous opening for five and one half years, with daily profuse expectoration; one recovered sufficiently to go on a whaling voyage, but died within two years after leaving the hospital. The other six patients were not relieved, but the result is not absolutely known.

In all these twenty cases the result was probably unfavorable owing to disease of the lungs, for it is generally accepted that in the majority of instances in which the lung is compressed for a long time, changes are developed of a chronic inflammatory character, which are fatal in their tendency. That such changes might readily occur in these cases is evident from the fact that in nine patients evidences of the presence of fluid had existed from one to six months before any attempt at removal, and in eleven from six months to two years. The majority of the patients were between twenty and thirty, at an age when disease of the lung is most common.

The two cases of recovery had the following history:—

I. December 15, 1858. The patient, a male, forty-eight years old, nearly-ten years before had pleurisy in the right side; he was able to be about in two months afterwards, with a little cough and dyspnoea on exertion. These symptoms continued for four years, but the patient was able to attend partially to business; at the end of that time there was flattening of the chest, with evidences of effusion. Three months later the effusion seemed to have disappeared, and the man continued in good health for five years, when a fluctuating tumor appeared over the right chest, and signs of the existence of fluid were evident. Two months later an attempt was made to introduce a medium-sized trocar behind the tumor, but the effort failed from the narrowness of the intercostal spaces. The tumor was then opened, with a free discharge of pus. All this time he had slight cough, but no râles were ever detected. He remained in the hospital for a few weeks and was then discharged.

Sixteen years afterwards he was seen, and said that "his health had been good since leaving the hospital, the discharge had continued for eighteen months and at the end of that time had ceased, and he had had no trouble since, except some dyspnoea on exertion." His general ap-

pearance was healthy. His right side was contracted and dull on percussion; respiration was pure but faint. Slight lateral curvature of spine existed.

II. October 6, 1869. The patient was a male, fourteen years old. Four months before his entrance he had chills, fever, and pain in the left side; he felt better in a few days, was then taken worse, with dyspnoea and cough, and was confined to bed eight weeks. At the time of entrance, signs of a large effusion were noted; the heart was pushed to the right of the sternum, and a bellows murmur was heard. Nothing abnormal was detected in the right lung. A week afterwards, the first paracentesis was performed, and four pints of clear serum were withdrawn, with relief. In ten days the effusion again increased, and four and a half pints of serum were withdrawn. The urine was normal. Two weeks later effusion required a third removal of fluid, and three pints of serum were obtained. Four weeks later the fourth paracentesis resulted in two and a half pints of serum. Two weeks after, the fifth paracentesis gave the same quantity of serum as the fourth. One week later, two pints of serum, with a little pus, were obtained. One month after, the seventh paracentesis, with two pints of fluid. For a few days his general condition appeared to improve, but for the next three weeks it failed, and four weeks after the seventh, the eighth paracentesis was performed, four months after the first, and two pints of pure pus were withdrawn. A few days later two canulae were inserted into the chest, the upper between the third and fourth ribs in front and the lower between the eighth and ninth on the side; the upper was removed after a few days, as it was found to be of no use. There was a slight discharge from the lower opening. Three days after, the patient was etherized and a large canula introduced. The pleural cavity was to be syringed daily with a solution of carbolic acid in water.

March 20, 1870 (five months after entrance), he was discharged with strength much improved. Faint respiration was heard down to the third rib in front and to the angle of the scapula behind. The heart was still at right of the sternum. The inner end of the canula became more and more elevated, apparently by the diaphragm. Pulse, 116. Temperature, 99.5°.

December, 1874, four and one half years after the last record, he wrote that he had used the syringe daily for six months after leaving the hospital, and then appeared to do well for three months, when there was a spontaneous discharge of two pints of pus, and after that he was perfectly well and had been able to do as hard work as ever. His spine was slightly curved.

Little need be said of the remaining class of cases, as they occur secondary to other troubles. They add to the gravity of the prognosis, and there is little hope of successful treatment. Of the twenty-nine

cases that occurred, sixteen died while in the hospital, three are known to have died after leaving the hospital, and in the remaining ten the subsequent history is unknown, but from the condition in which they left the hospital, nothing but an unfavorable result could be anticipated.

From the results of these last two series, little is to be hoped in the majority of cases from operative treatment as a means of cure; but it does certainly afford great temporary relief, and should be recommended where there is any doubt as to the disease of the lungs. But where pulmonary disease is clearly established, paracentesis should be preferred, as giving the patient less inconvenience with an equal amount of relief.

In the care of these cases, there have been suggested several points which are of practical interest. In one instance quite serious results appeared to follow the use of ether in order to produce insensibility. The patient became asphyxiated, and but for the prompt performance of tracheotomy would probably have died. As the asphyxia was relieved by tracheotomy, it appears to show that spasm of the glottis, rather than the ether, was the cause of the difficulty. That ether can be used with safety is shown by the fact that in the other four cases in which it has been used there have been no unpleasant results; one patient has been etherized five times, three times for openings into the chest, and twice subsequently, once to have a scrofulous testis removed, and again to have two fingers amputated for necrosis. Of course great care must be exercised in the administration of ether; it is found best to etherize with the patient in a sitting posture, as this gives the diaphragm the freest play.

After the introduction of the tube it is important that it should be kept in place firmly, that there should not be any pressure upon the wound, and that the tube should be so exposed as to be easily cleaned without having to move in and out, causing the passage to be irritated. Several shields have been devised for this purpose. But the one which answers these requirements best is a modification of the forms used here and at the City Hospital last year. A piece of sheet-tin about six inches long and three wide is cut in the form of an hour-glass. A hole is punched in the narrow portion, just large enough to carry the tube. A belt of thin sheet rubber is sewed to this shield, through small holes punched in its margin, and the narrow part is then arched over the wound. The belt is fastened round the body by means of buttons. Cotton wadding in a thin layer is placed beneath the belt and the ends of the shield. By this means the wound can be washed daily by syringing, and all the change necessary is to replace the cotton once a day.

The last and most important point is to keep the cavity thoroughly drained after it has once been opened. For a few ounces of decomposing pus will cause more hectic and constitutional disturbance than the amount previously inclosed in the cavity and protected from the air.

With the Compliments of Prof. Whitney -





